ENTOMOLOGICAL
SOCIETY OF
BRITISH COLUMBIA

PROCEEDINGS

OF THE

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(INCORPORATED)

1924

NUMBER TWENTY-ONE

Printed by
Evans & Hastings, 576 Seymour Street, Vancouver, B. C.

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TABLE OF CONTENTS

PAGE

Report of the Secretary-Treasurer 5

Presidential Address 6

Additions and Corrections to the List of British Columbia Orthoptera—E. R. Buckell 7

"Vespa": The First Paper Maker—W. B. Anderson 12

Notes on Collecting at Flowers and Blossoms—A. W Hanham 15

Entomologists, Modern and Ancient— R. S. Sherman 20

Leaf-Rollers Attacking Trees in the Okanagan Valley—E. P. Venables 22

New Records of Hemiptera from British Columbia—W. Downes 28

The Elm-Currant Aphis (Eriosoma ulmi L.)—R. Glendenning 33

Preliminary List of Aphididae of British Columbia—R. Glendenning 40

R. C. Treherne. In Memoriam 45

List of Members 47

BRITISH COLUMBIA ENTOMOLOGICAL SOCIETY

REPORT OF THE SECRETARY-TREASURER FOR THE YEAR 1923

I beg to submit the following report on the activities of the Society for the past year:

Finances

The Financial Statement shows a credit balance of $133.75. This compares very favourably with the balance of last year, $73.

Membership fees amounted to $52 this year, half of this going to the Ontario Society.

We received the usual grant from the Provincial Government of $250, which enables us to publish our Proceedings.

This cost $156, a reduction of $1.25 per page in the cost of printing was obtained this year, thus allowing a saving of about $57.

Proceedings

One number has been published this year. This, Nos. 17 and 19 combined of the Economic Series, contained several very useful contributions and has been in considerable demand.

We have now published twenty numbers of our Proceedings.

Incorporation

I am glad to be able to report that this has at length been accomplished. The cost as mentioned was $24.75, plus a lot of paper and ink.

Membership

The membership has remained stationary at thirty-two; a few have dropped out, but their places have been taken by most desirable substitutes.

Summer Meeting

The summer meeting in the Okanagan, proposed by Mr. Venables, which was to synchronize with the visit of the Dominion Entomologist, Mr. Gibson, was not held. Mr. Gibson did not visit British Columbia this year, and it was found that few if any of the coast members could make the trip.

Financial Statement for the Year 1923.

Receipts		Expenditures	
Balance from 1922	$ 73.80	Subscription to "Psyche"	$ 2.09
Bank Interest	4.05	Express	4.86
Subscriptions, 1922	2.00	Postages	22.00
Subscriptions, 1923	52.00	Sundries	6.00
Provincial Grant, 1923	250.00	Incorporation Fees	24.75
		Dues to Ontario Society	32.17
		Printing Proceedings	156.23
		Balance in Bank	133.75
	$381.85		$381.85

R. GLENDENNING,
Hon. Secretary-Treasurer.

Audited and found correct,
W. S. MOORE.

PRESIDENTIAL ADDRESS

To the Members of the British Columbia Entomological Society:—

Gentlemen,

It is with much pleasure that I welcome you to the 23rd Annual Meeting of the B. C. Entomological Society.

I am not going to weary you with a lengthy address, but will merely touch on a few matters which I think will form the subject of discussion during the meeting.

As you have learned from the report of the Secretary-Treasurer, the financial condition of the Society is satisfactory, there being a good balance on the right side.

The meeting this year is much later than usual owing to the fact the Secretary was in Ottawa most of the winter, and this may possibly militate to a certain extent against the attendance, especially in view of the fact that the spring is so much earlier than usual, and, as a consequence, field work is almost in full swing.

In a territory so extensive as the Province of B. C., it is always a very difficult matter to get many of the members together at any one time, scattered as they are over such a wide area, but more co-operation is possible through correspondence and exchange of material, etc., between members, and I should like to see more of this than exists at present, in fact to those of us who take up the study of entomology and who desire to have anything like a representative collection of B. C. material

in any of the orders, it is almost necessary, as the insect fauna of the different climatic belts of the province vary so much. We have moist belts, dry belts, high and low altitudes, and I think we have active members in all of these.

Our active members in the various orders have continued their work during the past year and have added considerably to our knowledge of the Entomology of B. C. I would particularly mention the work of the following members who specialize in their orders: Messrs. E. H. Blackmore, in Geometridae and Microlepidoptera; R. S. Sherman, in Diptera; R. Glendenning, in the Aphids; W. Downes, in the Hemiptera; E. R. Buckell, in the Orthoptera. Many other members have also been active in gathering material which has added vastly to the list of known species occuring in B. C.

In such generally studied order, even as the **Lepidoptera,** we have no check list anywhere near up to date, and here is a labor of love and value for such as have the necessary knowledge and the enterprise to carry it out.

Some of the other orders are almost virgin fields as far as B. C. is concerned, and offer to those who take them up the incentive of almost untrodden ground and new discoveries.

Life is never dull for those who have the desire to delve into the mysteries and beauties of nature, and a hobby, if you like to call it such, is a grand thing to fall back upon, and, I have even heard, conduces to longevity.

I trust our deliberations may result in much benefit to the Society during the coming year.

L. E. MARMONT.

ADDITIONS AND CORRECTIONS TO THE LIST OF BRITISH COLUMBIA ORTHOPTERA

BY E. R. BUCKELL.

In the Proceedings of the British Columbia Entomological Society for 1922 (Systematic series No. 20.) there was published a list of the **Dermaptera** and **Orthoptera** recorded from British Columbia prior to 1922. The list was intended as a basis on which to build up an authentic check list of the **Dermaptera** and **Orthoptera** of British Columbia.

In the present paper twelve species are added to the list, some necessary corrections made, and occasional notes of interest are added to species previously listed.

I am indebted to Messrs. J. A. G. Rehn and Morgan Hebard for many of the corrections made and for the determination of material and permission to use certain racial names.

New Records.

Family **Arcrididae**

Subfamily **Oedipodinae**

Xanthippus leprosus (Saussure), 1884.

Saussure, H. de. Mem. Soc. Geneve, XXVIII., p. 89 (1884).

This large red-winged species is found throughout the interior dry belt from the Chilcotin district to the southern Okanagan valley. The winter is passed as a nymph in hibernation.

Locality Records. Oliver, 1919; Chilcotin, Williams Lake, Big Bar, Rock Creek, Nicola, Minnie Lake, Douglas Lake, Chapperon Lake, Aspen Grove, Knutsford, Beresford, Kamloops, Vernon, 1922; Merritt, Princeton, Hedley, Keremeos, Osoyoos, 1923 (E. R. Buckell).

Dissosteira spurcata (Saussure), 1884.

Saussure, H. de. Mem. Soc. Geneve, XXXIII., p. 134 (1884).

Two males of this species have been taken in August at Oliver, in the southern Okanagan valley. They were found on a sandy flat close to the Okanagan river, amongst a scant growth of Sage-brush (**Artemisia tridentata** Nutt.), Rabbit-bush **(Bigelovia graveolens** Nutt.), and Antelope-bush **(Purshia tridentata** D. C.).

Locality Records. Oliver, 1922-23 (E. R. Buckell).

Trimerotropis gracilis (Thomas) 1872.

Thomas, Cyrus. Rep. U. S. Geol. Surv., Montana, p. 461 (1872).

This is not a common species in British Columbia, but occurs in small colonies amongst Sage-brush in warm, sheltered localities.

Locality Records. Chilcotin, 1921; Kamloops, 1922; Nicola, 1923 (E. R. Buckell).

Subfamily **Acridinae**

Melanoplus scriptus (F. Walker) and **Melanoplus repletus** (F. Walker) were recorded from Vancouver Island by Francis Walker and described by him in the Cat. Derm. Salt. Brit. Mus., IV., pp. 680 and 678 (1870).

Mr. B. Uvarov has recently been revising the Walkerian types in the British Museum of Natural History and has sent me the following notes on these species. "There is no doubt that **M. scriptus** (F. Walker) is a synonym of **M. bilituratus** (F. Walker), and the types agree absolutely with Scudder's description and figure in his Monograph." The

type of **M. repletus** (F. Walker) has apparently been lost, and Mr. Uvarov believes that a female of **Melanoplus femur—rubrum** (De Geer) from "N. America" is the actual type of **repletus,** although he cannot as yet find any actual proof of it.

Melanoplus borealis junius (Dodge) 1876.

DODGE. Canad. Ent. VIII., p. 9 (1876).

This geographic race of **Melanoplus borealis** (Fieber) has been erected for **Melanoplus junius** (Dodge) by Mr. Morgan Hebard, who kindly identified a small series of specimens from Anahim Lake, in the northern Chilcotin district, as this race. They were taken in a shady situation at the edge of a big bog.

LOCALITY RECORDS. Anahim Lake, 1921 (E. R. Buckell).

Phoetaliotes nebrascensis (Thomas) 1872.

THOMAS, CYRUS. Rep. Geol. Surv., Montana, p. 455 (1872).

This species was found commonly on certain stony hillsides, in the southern Okanagan valley, at Oliver. All the specimens seen were **brachypterous.**

LOCALITY RECORDS. Oliver, 1922-23 (E. R. Buckell).

Bradynotes pinguis (Scudder), 1898.

SCUDDER, SAMUEL H. Proc. U. S. Nat. Mus., XX., pp. 81, 85 (1898).

In 1922 a few specimens of this wingless species were found on the higher slopes of the hills, near Rock Creek in the Kettle river valley, where they were associated with **Asemoplus montanus** (Bruner). In June, 1923, a large colony was seen on the western slope of Anarchist Mountain, above Osoyoos Lake, in the southern Okanagan valley. They were found in open grassy glades in the forest above the 3,000-foot line. This habitat was similar in every way to that in which **Bradynotes chilcotinae** (Hebard) has been found in other parts of the province, but the two species have not as yet been found inhabiting the same area.

LOCALITY RECORDS. Rock Creek, 1922; Anarchist Mt., 1923 (E. R. Buckell).

Family **Tettigoniidae**
Subfamily **Stenopelmatinae**

Cyphoderris piperi (Caudell), 1907.

CAUDELL, A. N. Ent. News. XVIII., p. 335 (1907).

The records of this species in British Columbia have been incorporated in the past under **Cyphoderris monstrosa (Uhler).** Since the striking differences in the male genitalia of the two species were pointed out to me by Mr. B. B. Fulton, an examination of the available British Columbia material has shown that both species are present and that there are considerably more males of **piperi** than of **monstrosa** in the collections.

Both species have been seen at Nicola in large numbers during late May feeding together upon flowers of **Amelanchier cusickii** (Fer.), **Amelanchier florida** (Lindl.), and **Elaeagnus argentea** (Pursh).

Locality Records. Peachland, 1907; Lillooet, 1920 (A. B. Baird); Nicola, 1922-23 (E. R. Buckell).

Subfamily **Decticinae**

Peranabrus scabricollis (Thomas) 1872. The Coulee Cricket.

Thomas, Cyrus. Hayden's Rep., Geol. Surv., Montana, p. 441 (1872).

Small colonies of the Coulee cricket were found at Stump Lake and near Aspen Grove in the Nicola valley in 1922. All the specimens found were bright apple green.

Locality Records. Stump Lake, Aspen Grove, 1922 (E. R. Buckell).

Steiroxys trilineata (Thomas) 1870.

Thomas, Cyrus. Proc. Acad. Nat. Sci., Philad., p. 76 (1870).

This species was recorded in the previous list as **Steiroxys** sp. (Proc. B. C. Ent. Soc. p. 36. Systematic series No. 20, 1922).

A number of males were secured in 1922, making the determination of the species possible.

Locality Records. Chilcotin, 1920-21; Nicola, Aspen Grove, Kamloops, Penticton, Oliver, Osoyoos, Rock Creek, 1922-23 (E. R. Buckell).

Family **Gryllidae**
Subfamily **Gryllinae**

Nemobius fasciatus (De Geer), 1773.

De Geer. Mem. l'Hist. Ins., III., p. 522 (1773).

This species occurs commonly in fields at Kelowna, on the Okanagan Lake. It has not been found elsewhere in the province.

Locality Records. Kelowna, 1922-23 (E. R. Buckell).

Corrections and Notes of Interest.

Since the first list was prepared it has been found necessary to make certain corrections and alterations, which are here set down in the order in which they occur. Notes of interest on some of the species are also included.

The **Grylloblattidae** were placed in the previous list as a sub-family of the **Orthoptera.** This is incorrect, as they are considered to constitute a distinct order, the **Notoptera** (Crampton, 1915), or **Grylloblattaria** (Bruner, 1916).

Acrididae

In the genus **Xanthippus** (Saussure) a large number of specimens of **Xanthippus neglectus** (Thomas) and **Xanthippus obscurus** (Scudder)

have been collected. Series of these were sent to Messrs. J. A. G. Rehn and Morgan Hebard, who informed me that they consider **Xanthippus obscurus** (Scudder) to be an absolute synonym of **Xanthippus neglectus** (Thomas); and it must therefore be struck off the list.

It is further considered that the species listed in the present paper as **Xanthippus leprosus** (Saussure) and the species listed in the former paper as **Xanthippus latefasciatus** (Scudder) probably represent one species in British Columbia.

They find that the material submitted to them for determination during the past few years agrees with material determined by Scudder as **leprosus**, but may not be identical with the **leprosus** of Saussure, which was described from Mexico. The genus is a difficult one, and more work is needed to definitely determine what species we have represented in Canada. The two names, **leprosus** and **latefasciatus**, are temporarily retained until further work can be done on the genus.

Mr. Rehn informs me that in the genus **Trimerotropis** the species listed as **Trimerotropis ferruginea** (McNeill) will probably be found to be a synonym of **Trimetropis caeruleipes** (Scudder).

The record of **Trimerotropis citrina** (Scudder) was made from a single specimen collected by Mr. E. P. Venables at Vernon in 1905 and recorded by Dr. James Fletcher as this species. The specimen has been examined and found to be a male **Spharagemon aequale** (Say) in which the notching of the median carina of the pronotum closely resembles a member of the genus **Trimerotropis**, as there is a distinct second notch, a feature which occasionally occurs in specimens of **Spharagemon aequale** (Say).

It is probable that **Trimerotropis citrina** (Scudder) will not be found in Canada.

The type specimen of **Trimerotropis longicornis** (E. M. Walker) was recently compared by Prof. Walker and the author to material collected in British Columbia which had been determined by Mr. Rehn as **Trimerotropis monticola** (Saussure), and found to be very close to if not identical with this material. In British Columbia **Trimerotropis monticola** (Saussure) has yellow hind tibiae and does not bear much superficial resemblance to the **monticola** found on the prairies in Canada. It is thought, however, that **Trimerotropis longicornis** (E. M. Walker) may eventually be found to be **Trimerotropis monticola** (Saussure).

Mr. Morgan Hebard informs me that he finds **Melanoplus flabellifer** (Scudder) to be an absolute synonym of **Melanoplus occidentalis** (Thomas).

In the previous list I placed Thomas as the author of **Melanoplus mexicanus atlanis**; this is incorrect and should read (Riley) Ann. Rep. Ins. Mo. VII., p. 169 (1875).

The author of **Melanoplus borealis monticola** is Scudder and not Fieber, as I stated, and should read: Scudder, S. H. Proc. Amer. Phil. Soc. XXXVI., p. 24 (1897). The spelling is incorrect in **Melanoplus washingtonianus,** and should read: **Melanoplus washingtonius** (Bruner).

Tettigoniidae

In the previous list **Cyphoderris monstrosus** (Uhler) should be **Cyphoderris monstrosa** (Uhler), Proc. Ent. Soc. Philad., II., p. 551 (1864).

The use of varietal names in so variable an order as the **Orthoptera** is not generally considered advisable and **Anabrus simplex** var. **maculosus** (Caudell) is best recorded as **Anabrus simplex** (Haldeman). Stansbury, Exped. Great Salt Lake of Utah, p. 372 (1852).

Further study in the British Columbia material of **Conocephalus fasciatus** (De Geer) by Messrs. Rehn and Hebard has shown that **Conocephalus fasciatus fasciatus** (De Geer) and intermediates between this geographic race and **Conocephalus fasciatus vicinus** (Morse) occur, but probably true **vicinus** will not be found in British Columbia.

"VESPA"
The First Paper Maker

by W. B. Anderson.

We, of this age of inventions, of useful commodities of all kinds, of thousands of things little and big which have been evolved for the convenience and the comfort of us pampered humans, seldom if ever pause to think of the long trails made by patient toilers, which lead eventually to the successes as we know them. Do we ever consider, when looking at and admiring a beautifully finished sword, that the first sword was made of a thin slice of intensely hard stone, cut from the larger block by means of a sandstone slip, sand, water, and days, nay weeks, of hard labour? Do we ever consider that the surgeon's keen scalpels had their beginning in a bit of sharp shell, or agate chip? Very few, among a million people, give thought to the evolution of the commercial article in every day use.

We read a book, admire the print, the binding, the texture of the paper. We sit down to write on various themes, and at times throw down pen or pencil with a "Pshaw, why don't they make better paper to write on?" Forgetting for the time, that the first documents were scribed on stone; then on bark, or papyrus, until at last some human more clever than the rest, or one who desired less manual labour in indicting his love letters or his declarations of war, hit upon a scheme whereby some vegetable substance was pulped, mixed with a glutinous vehicle, then spread thin and dried; with the result that a material was finally

produced which could be written upon. This probably was after the age of sheepskin; sliced piths of shrubs and plants and other substances which, in their day, were considered the "dernier cri" in material for the art.

Who was the man, and of what people came this observer? Of the Chinese? Perhaps; for these people have been, and probably always will be, better observers of natural phenomena and of Nature's handiwork than we "superior" races. For mark; there was a paper maker before his day. Had been, since Nature first evolved him from some obscure, crawling form of Primordial life.

We, to-day, look with wondering eyes on the vast intricacies of the modern paper mill. We see the great logs drawn into the gangs of saws, and we follow the course of the blocks until we see the sheets of beautiful snowy paper slowly rolling up, a hundred yards or more away from the starting point. We marvel that man ever could conceive the idea of thus turning a hard, woody substance into the beautiful, pliable commodity which, were we to now be suddenly deprived of, would stop the commerce of the world. But the basic method was followed ages before history began by a little insect which we know to-day as "Vespa," the Wasp. It only remained for an observant human with a disinclination for the hard work necessary in chipping or scribing hard stone, or dressing tough sheepskin, to note ways of friend Vespa, to copy him, and to improve his methods, until he produced a substance white enough, and tough and smooth enough, to enable him, with the aid of a pointed stick and a little coloured fruit juice, or blood, to easily set down his ideas. The rest was simply a matter of persistent endeavor in evolution.

Years ago, when a boy, I was fortunate enough, from a persistent habit I had of watching birds, beasts and reptiles going about their daily housekeeping tasks, to see Vespa busy at the operation of paper making, and, for the benefit of those of this Society who perhaps have not been so lucky, I shall describe as nearly as possible the way she went about the task.

In those days, what are known as "Snake" rail fences, went zig-zagging about all the fields. Made of 12-ft. split sections of the Douglas Fir, these singularly unbeautiful creations were nevertheless a boon for the wasp folk, for, as I watched a lady wasp buzzing about, she alighted on a rail, and, after a little searching, began to chew with her strong mandibles on a part of the soft layer of the annual ring, meanwhile wetting the resulting mass with a presumably sticky exudation from her mouth. After a few minutes work, she had collected a round ball, the size of a small pea, of perfect pulp, (I will here digress to read a bit from Kirby, Assistant in the Zoological Department in the British Museum, who, in describing "Vespa," says: "These nests are composed of a material resembling thin, coarse brown paper.")

If my audience will follow me, I think it will agree with me in spite of this authority's words that the material, apart from "resembling," is, in fact, coarse brown paper-grey, to be correct. To proceed; the wasp, after gathering together the little pellet of pulp, flew to a nearby shrub, where, on the underside of one of the smooth, wide leaves, carefully spread with feet and mandibles her little bit of paper material, then back to the rail to collect more pulp. Not always returning to the same bush for the spreading operation, until at length, I presume other household cares claimed her attention, as she flew away and came no more.

Afterwards, (shall I say the next day? I fancy that will be nearly right), I again took my post near the paper bush. I had not been there long when Mrs. Vespa came buzzing about, and though I then, and always have had, a deathly fear of wasps, I stood my ground, soon perceiving that paper making was to the lady of far greater importance than stinging a boy dressed in dirty face and ragged pants. Soon she alighted on the bush, on one of the very leaves under which she had plastered a bit of pulp. Carefully taking a corner of the now dry paper in her mandibles, she gently pulled the sheet clear of the leaf, and taking wing, flew away with a dirty grey banner trailing beneath her body, a sheet measuring perhaps three-quarter-inch of irregular shape.

That closed the book for the time being, for being "**Vespa occidentalis**" (or shall we say, "**Vespa vulgaris**, var. **occidentalis?**") her nest was underground, and the last I saw of her was a busy wasp dragging a folded bit of paper into a hole in the ground. Having become interested in this paper-making operation, I later watched nest building operations whenever possible, and was finally lucky enough to see the operation of building up. This time it was another of the paper-makers, the Black Hornet, who showed me the way, whose nest, being built above ground, gave a good view of the work. Alighting on the nest with a piece of paper of much the size and appearance of that made by "**Vulgaris,**" the insect proceeded to a part evidently being built on or strengthened. She attached one corner of the sheet to the nest, and gradually spread it smooth, at the same time wetting the edges with (presumably) mucous saliva, tamping the whole quite smooth, the whole operation taking perhaps 30 seconds. This, in brief, is the story of Vespa's paper-making and building up. It is of course well known that the queen lies dormant in some snug place during winter. In early spring, she bestirs herself with the first warm rays. A small nest is made without delay, this of less than one inch in diameter, in some sheltered place above ground. I am again speaking of **Vulgaris**—in which she lays 3 or 4 eggs—seldom more at first, each in its tiny cell (paper cells too), and from this on the life history is easily traced. The first brood help build a bigger nest, also above ground, and this brood in turn help the colony, which, at a certain stage in life's affairs, digs its underground chamber in which is built the final nest from which the members emerge in search of prey, belted war-

riors filled with more concentrated, villainous bitterness than so many rattlesnakes, always prepared to give battle to any moving thing in the vicinity of the nest, the unwary entomologist included.

A habit of this same wasp which I at one time noted may be of interest. The season opened early and warm, and the common wasp made many flourishing colonies. Later on, the weather turned very wet, and in a field of barley, where were many wasps nests, the careful householders of the underground communities built chimnies of clay, to the height of three or four inches, above the mouths of their underground passages, without doubt to guard against flooding from sudden downpours of rain. I have never since been fortunate enough to see these structures at the mouths of the nests.

NOTES ON COLLECTING AT FLOWERS AND BLOSSOMS

BY A. W. HANHAM

Looking back over the notes and records started soon after I came to Canada in December, 1881, I have jotted down in this paper some items that may be of interest.

I had my introduction to Canadian Entomology at Ottawa in 1882, with such enthusiasts as the late Dr. James Fletcher, and the late W. Hayne Harrington, to speed me on my way; the former with the butterflies and moths, and the latter with the beetles. Later on, at Quebec, I had the pleasure of working in these with the late Rev. T. W. Fyles, and when I came out to this coast, with the late Rev. G. W. Taylor, and late Capt. R. V. Harvey, with insects and shells.

All these old friends and kindred spirits have passed on; yet one remains, your President, Mr. L. E. Marmont, with whom many happy days and outings were spent at Brandon and Rounshwaite, Man., during a number of years when I was stationed at Winnipeg.

From Ottawa, I was moved to Paris, Ont., and then to Hamilton and Brantford, Ont., thence to Quebec City, in 1891, to Winnipeg in 1893, and to Victoria, B. C. in 1901. From these remarks you will see that I have had exceptional opportunities of collecting in many parts of Canada.

In 1888 I recorded the capture of a number of noctuids—as many as 100 specimens in one evening—off sunflowers in my garden at Hamilton, Ont., in August, towards dusk. In May and June a number of species of **Coleoptera**, mostly **Cerambycidae**, off hawthorn blossom in open bush, along under the mountain there. In June, 1889, six species of **Sphindidae** from flower beds, one evening at Port Dover, Lake Erie, on June 12th, 1892, on Isle d'Orleans, lying in the St. Lawrence River,

a few miles below Quebec City, a rare Blister beetle, **Pomphopoea sayi**, at elderberry flowers; and on the same Island on Aug. 10th, 1893, flying about the spreading dogbane **(Apocynum androsaemifolium)** in a small clearing, 30 specimens of **Autographa**, 7 or 8 species being captured. 1894 found me settled in Winnipeg, and I record little seen or taken on flowers or blossom, except butterflies and beetles, until well on in the summer or fall, when the Canada thistle **(Cnicus arvensis)**, asters and golden rod were out. At Bird's Hill, near Winnipeg, on Labor Day, 1890, some good noctuids (day flying) were swept off golden rod, and some rare beetles **(Lebia)** off asters. On July 29th, Aug. 2nd and 5th, 1900, a number of **Melicleptria villosa**, form **sexata**, were taken at rest in the centre of a purplish daisy **(Chrysanthemum leucanthemum)**, and in the same meadow I swept off flowers, my first specimen of **Pamphila ottoe**. During my sojourn on the Prairies my best collecting off flowers was made at Brandon and Rounshwaite, Man., where in 1896 and 1897, particularly, as recorded in Vol. 30 of The Canadian Entomologist, many good species of noctuids were swept at dusk in July and August off the following; the spreading dogbane, wild bergamot or horsemint **(Monarda fistulosa, var. mollis)**, Scotch thistle **(Cuicus undulatus)**, wild sunflowers **(Helianthus scabra and rigidus)**, and species of golden rod, of which Solidago rigidus proved the most attractive. The moths included **Autographa biloba, brassicae, flagellum**, and **californica** (the last named was looked on as a rarity on the Prairies.) Perhaps at Rounshwaite, where I was the guest of Mr. Marmont, on several occasions, **Oncocnemis atrifasciata** was our most beautiful, if not also our best catch.

In August, 1896, five specimens of **Eosphoropteryx thyatyroides** were taken at dusk in Elm Park, Winnipeg, off one of the above-mentioned sunflowers **(scabra)**.

During flying visits to Carberry, Man., I bagged my first specimen of **Argynnis nevadensis** (green washed frit), a number of **Eurymus** (albinos), **Euptoieta claudia** and some rare "Skippers," off milk weed; and at dusk off golden rod, many rare noctuids, including **Oncocnemis viriditincta**; the only time I ever took it. When I lived in Victoria, Goldstream was a favorite hunting ground with me, and in May and June especially, many good captures were made on the mountain slopes, and along the railway line; needless to say, the majority off flowers. I remember my first view of the Dogwoods in flower, and my disappointment when I found that virtually nothing seemed to be attracted. One year in May, in Victoria, I took some nice noctuids about the holly trees in blossom. Since my residence near Quamichan Lake, 2½ miles from Duncan, V. I., where I came in 1906, I have devoted much time to collecting at flowers chiefly in my own garden. In August and September, 1913, at dusk, off sunflowers, I made my first big catch here of **autographas**; they included nine species; the sunflowers were mostly of the double variety. I first grew **Mathiola** (night blooming stock) a year or two

later, and took my first **Autographa speciosa** off it in July, 1915. I have planted special beds of this highly scented flower since I discovered its attractive properties, and have taken **speciosa** every season; it is on the wing from the beginning of July until about the 20th. In September, 1922, I took a pair of **Autographa brassicae** at the flowers, a new record for Vancouver Island, and an addition to my B. C. collection.

Last year (1923) my record for the season, from the beginning of July to the beginning of October, was 11 species of Autographa, some 150 specimens. Every species that I have taken on the Island has been attracted, except Mappa, which flies in June before the flower are out. Strange to say comparatively few other species of noctuids appear to be attracted to this flower, although I have twice taken single specimens of **Cucullia.** I have taken the Peach-blossom moth **(L. pudens)** at blossom of the wild cherry.

Last year a neighbour, Mr. Demus Ashby, called my attention to the attractiveness of the Tansy ragwort; Stinking Willie is another name for it, and a fitting one, for it has a very strong sour, disagreeable smell—and he gave me some plants. I can truthfully state that I have never before seen such swarms of insects on any flowers or plants. All orders were well represented, but, as the flowers were not open until the beginning of August, not many species of **Diurnals** were out to be attracted. **Hymenoptera** simply swarmed; the **Coleoptera** were mostly "Ladybirds," and "Longhorns," but here again not a great number of species of the latter were still about; I, however, took two species new to this district. **Hemiptera** were abundant, and **Diptera** also. **Micro-Lepidoptera** were attracted in numbers, and species new to me turned up, including our tinyest "Plume" **(Trichoptilus pygmaeus),** and **Allononyma vicarialis;** of the latter I caught about twenty specimens during August, all during the daytime, never towards dark or later. Strange that, during a residence at Quamichan of 18 years, I had never run across it before. This handsome little moth skipped about on the flower heads, usually with its wings out at right angles or up-tilted; once it took flight, it disappeared from my vision. This moth was met with one season at Goldstream in August. In the evening a lot of "Micros" were on the flowers, also noctuids and geometers. Among the latter the pick was a specimen of **Cleora albescens.** If this plant (it is really a weed) could be persuaded to flower earlier than August, the possibilities of its attraction would be almost unlimited. To all collectors of "Bugs" possessing a garden, my advice is, grow a patch of **Tansy ragwort,** and one of **Mathiola;** the flowers of the latter, except on rainy or very dull days, close up entirely, and it is therefore no use for day collecting. Honey suckle (not the wild kind) draws the **Sphingidae,** and Lilac (I only grow the white variety) attracts well; in the day time **Papilios** and clear wing moths, among them **Proserpinus clarkiae** and **ulalume**—both rather rare species usually—and towards evening many of the early appearing **Polias,** etc.

I should not omit to refer to collecting at "Sallows." I do not remember doing any "sallowing" worth mentioning in Ontario, Quebec, or on the Prairies, nor during my stay in Victoria, chiefly for lack of any convenient localities, easy of access, but since I came to Duncan, this mode of collecting has been almost a yearly event. Accompanied often by my friend and next door neighbour on Quamichan Lake, Mr. G. O. Day, I have enjoyed many profitable evenings, and without going any distance away from home. Sheets spread under the trees—some of them quite large and tall—some vigorous shaking, lamps, cyanide bottles, or pill boxes, and then often a rich and varied harvest. The noctuids usually sit dormant on the sheets long enough to allow one to pick and choose. The **Geometers**, which come in surprising numbers, have to be collected off the flowers, or flushed before it is too dark to see, and then taken in the net. All the native species of **Stretchia, Xylomyges, Perigrapha, Orthosia, Graptolitha, Xylena**, and other early flying species, may be taken in one good season. The season varies a good deal, according as it may be an early or late one, mild or chilly. This year (1924) some of the sallow noctuids appeared before the last days of February.

In British Columbia I miss the collecting off "Milk weed;" in Ontario, Quebec, and to a lesser degree on the Prairies, the flowers proved highly attractive to butterflies, especially perhaps the larger **Argynnids.** I regret that I never tried the "Milk weed" of an evening. I wonder if any Lepidopterists present have ever taken that beautiful noctuid, **Rhodophora florida**, at the flowers of the wild evening primrose (**Oenothera biennis**). Perhaps the moth does not occur anywhere in B. C., but I noticed the plant in flower, and fairly abundant around Agassiz in August, 1922. I have taken the moth back East, and on the Prairies, and found it at rest in the daytime, partly in the closed flowers; with its pinkish primaries, it was a feast to the eyes.

In 1919 and 1921, with Mr. Day, and in 1920, with Mr. Glendenning, Mount McLean, in the Lillooet District, was visited. In the two last years we camped at 5,000 feet, and a number of trips were made to the higher elevations, and to the summit nearly 8,000 feet. I think most of our best collecting was done off flowers above the tree level, at about 7,500 feet. There are meadows of fairly level ground, quite extensive, and, on the whole, well carpeted with flowers. Some kinds were over when we were up in August, the **Anemone occidentalis** were all seeding; they were abundant from 5,500 feet up, and the heather was mostly past also. Where the flower patches were thickest, **Diurnals**, especially the "Blues," simply swarmed in 1920 (August 22nd and 23rd). It was here that I took two species of **Syngrapha**; in 1921 none were seen, I think because we were a couple of weeks ahead of the 1920 dates. The patches of flowers consisted chiefly of a large flowered Aster **(apricus)**, yellow or orange daisies **(Arnica)**, and another tall yellow flower **(Aplopappus)**. One day in 1920 at 2 o'clock, and the second as late as 4 o'clock, **Hepialus**

marglashani was taken over and about one of these patches, dashing around rather wildly. I am not sure that they were attracted by the flowers to any extent; perhaps one of them was its food plant, and I forget whether I took any except on the wing. Noctuids were plentiful also in individuals—if not species—on the flowers, and one kind could be swept off a dwarf **Solidago**, only a few inches high. Yarrow or Milfoil **(Achillea)** Lupins, and Fire-weed, rather dwarfed, all three growing fairly high up, say about 6,500 feet. We did not find worth while visiting **Angelica**, and **Heracleum** flowers were quite attractive to all orders, but did not , I think, grow higher up than 5,500 feet.

In the rocky ravines, and on the slopes towards the summit, a silene occurred; this is the moss-campion, with tiny pink flowers on a greenish cushion lying close to the ground. **Lasiestras, Lasionyctas,** and **Orosagrotis incognita** favored this silene, sometimes half a dozen of them on one plant, and it was on this that I took all my specimens of Autographa alta. The beautiful "Copper," **Heodes cupreus**, could occasionally be swept off the scattered plants of Arnica on the slopes, but they usually preferred to sit down among the rocks in the ravines, like the Anarta and Sympistis, though in 1921 I swept some of them (the latter) off a tiny white flower, a few inches high, growing by one of the lakes at 7,500 feet.

Around our camp in 1921, especially at dusk, a number of things were taken at the Asters, these included some **Autographas,** and **Oncocnemis hayesi, Paroa-nigra,** and **chandleri,** also **Euxoa brocha.** Alpine collecting for **Coleoptera** did not come up to expectations, but some good species of Cerambycidae, were taken on Mount McLean in 1920 and 1921, and on Mount Cheam in 1922, all picked, or swept off flowers, chiefly umbelliferus plants. Two specimens of a small clear-wing moth were taken off these in 1921. In the spring of 1905, I was fortunate in being able to visit Southern California; I was down there from the end of January into May. At the beginning of February, **Autographa californica** was out in large numbers, flying about some flowering shrubs during the day in the gardens; the only other species met with were **brassicae,** and on Catalina Island, one **biloba**; other noctuids were very scarce, with the exception of species of **Melicleptria** and allied genera. Some of these were quite common, some of considerable beauty; the flowers off which I swept them were mostly strangers to me. That exquisite "Blue," **Philotes sonorensis,** was flying with the moths in March and April. The very tiny "Blue," **Brephidium exilis**, appeared to hug the coast line. The Cacti flowers only seemed to attract small beetles. Species of **Brenthis, Euphydryas** and **Melitaea** were fairly abundant, and at Santa Barbara in May **Dione vanillae** and **Junonia coenia** were not uncommon; both are handsome butterflies. Most of my collecting was done at La Jolla, near San Diego; all that country is treeless, except for the fruit orchards, and the catch made during my stay was hardly a rich one. My intention had been to deal with the results and possibilities of collecting "At Light" also, but the present paper is already unduly long.

ENTOMOLOGISTS, MODERN AND ANCIENT

by R. S. Sherman.

As the years speed by I begin to realize the great changes that have marked the study and pursuit of entomology during the half century covered by my conscious experience. It occurred to me that it might be of interest to some of the younger knights of the net to listen for a few minutes to the rambling thoughts of one of the old school.

My first collecting was done during the seventies in the vicinity of Belleville, Ontario. The only entomologist of my acquaintance—a distant, awe-inspiring acquaintance—was Professor Bell of Albert College. I saw him twice; once with net in hand in dignified chase of some elusive hexapod; and again when I carried to him a male rhinoceros-beetle. This ferocious creature had broken cover from a jungle of dead leaves, and I can remember the powerful thrust of his horned head and doughty legs as he tried to free himself from my grasp. I took him to the professor, who pronounced him a rare capture and a new record for Canada. From that moment the virus of the collector entered my blood and has not yet worked its way out of my system.

Naturally, on the strength of this capture, I ran largely to coleoptera during the first part of my entomological career. There was good hunting in those days. The beech and maple forests had not yet fallen beneath the all-consuming axe of the farmer. From the opening of the first hepaticas to the waning of the golden-rod, the forest aisles were a-hum with insect life. Nor did the snows that lasted from November to April put an end to our entomological pursuits. The half-rotted logs of beech and maple yielded treasures sufficient to keep our interest alive throughout the winter.

I suppose there is no entomologist who has not succumbed, for a brief period at least, to the manifold charms of Madame Butterfly. And who that has once seen our mountain meadows in all their glory could fail to admire those living, palpitating flowers of the air, flitting from bloom to bloom and making the sunlight vibrant with their beauty? Yes, like the rest of you, I had my fling at the butterflies.

But there came a time when the needle of my inclination refused to oscillate to these local attractions, however alluring, and settled down to the pole star of my destiny—the diptera; and there I think it will remain. A recent writer in the Canadian Entomologist, commenting on the reasons which lead one man to work upon dragonflies, another on butterflies, and a third on beetles, states that "he himself was irresistibly drawn towards the smallest and most intrinsically uninteresting of insect forms." That explains nine-tenths of our predilections. Yet I am convinced that the true entomologist is broadminded enough to find something of interest in all of nature's forms. Personally, though I "run to diptera," I

am a lover of all Mother Nature's children, be they birds, beasts, insects, or plants; and though I have been a collector for nearly half a century, my keenest pleasure has always been derived from watching the living creature at work or play. The economic value of an insect, bird, or mammal weighs but little in my regard. And just there is the line of fission between the old and the new entomology. The question of dollars and cents looms large on the mental horizon of the modern man; with the old-timer dollars and cents were a minus quantity.

I realize fully the importance of the economic side of entomology. As a citizen I am most keenly alive to the valuable—nay, I may say the invaluable, work which is being carried on by the gallant band of workers selected by the government to control insect pests. It is a noble, a patriotic work; but to me it makes little appeal. Nor do I think that I am alone in this avoidance of the economic side of entomology. I think I belong to a class (a vanishing class, it may be) who study the insect purely for the inherent interest in the creature itself.

There is a third class of entomologists, off-shoots or by-products of the other two—the simon-pure systematists, who care not an atom, or should I say an electron? for the creature, living or dead, except in so far as it avails them to add another Greek-and-Latin hybrid of a name to the hair-splitting monographs they are compiling. The late S. W. Williston, commenting on this modern mania for multiplying genera and species, says: "By an excessive splitting of genera broader relationships are lost sight of, and the tendency is inevitable to restore those evidences by the invention of new group terms to express them. Possibly it may be necessary some time in the future to have a quantitative chemical analysis of a mosquito before deciding to which genus it may belong.....convenience is an important end of classification, as well as the expression of relationships."

What amateur entomologist can hope to keep abreast of the bibliography that is piling up in his own particular group? And look at the changes in nomenclature that are thrust upon us! No, I am convinced that the old-fashioned entomologist will soon become extinct, like the Dodo and the Great Auk. And it is a pity; for he was a harmless imbecile and afforded rare sport for the small boy and the yokel.

I cannot conclude these rambling remarks without a reference, however brief, to some of our departed members, good men and true, who wielded the net in woodland trails that now are paved highways, and in primeval forest vistas that now form the bedraggled outskirts of a great metropolis.

The Rev. G. W. Taylor was a typical entomologist of the old school, and one whose work in his special field will long endure. So, too, was Tom Wilson, who carried on his work and his interests as an amateur and a collector while faithfully performing his duties in the economic field.

His close companion and collaborator, Arthur H. Bush, was never happier than when displaying the beauties of his wonderful collection to timid tyros among the younger group of entomologists, and in giving them assistance and advice. But to Capt. R. V. Harvey our society is particularly indebted for the impetus which his splendid personality gave to the initial growth of our organization. He had the rare faculty of inspiring and fostering enthusiasm in all who were associated with him. Having travelled with him over three hundred miles of mountain trails, I learned to value him as an ideal "guide, philosopher, and friend."

In conclusion, let me say that in our present society I believe we have men of whom any similar institution in America might well be proud. The least that we can do is to foster that spirit of comeraderie and good-fellowship without which the fires of achievement turn cold and crumble into the ashes of disappointment. Give the word of praise and encouragement now, when it may bear fruit, not reserving it as a flourish at the end of an obituary.

LEAF-ROLLERS ATTACKING ORCHARD TREES IN THE OKANAGAN VALLEY

By E. P. Venables,
Dominion Entomological Branch, Vernon, B. C.

The collection and breeding of larvae causing typical leafroller injury in the dry belt of British Columbia during the past few seasons has revealed the presence of four species of **tortricid** moths, viz.: the fruit-tree leaf-roller, **Cacoecia argyrospila** (Walker), the oblique-banded leaf-roller **Cacoecia rosaceana** (Harris), **Tortrix alleniana** (Fern.), and **Peronea maximana** (B. and B.). Prior to the year 1918 injury caused by leaf-roller larvae was as a rule attributed to **Cacoecia rosaceana** (Harr.). It was a matter of uncertainty as to whether the fruit-tree leaf-roller actually occurred in the Okanagan Valley at that time. This latter insect is included in the check list of British Columbia **Lepidoptera** published in 1906, being recorded from the coastal district, and at Kaslo. It is also listed by Dr. Dyar in his "Lepidoptera of the Kootenay District of British Columbia" as having been captured near Field in 1903. It was first actually bred from Okanagan material in 1922, though egg masses supposedly referable to this species were noted by Mr. R. C. Treherne in 1921 on apple trees at Kelowna. **Cacoecia rosaceana** (Harr.) has undoubtedly been present within the province for a number of years, and has been frequently mentioned in the lists of injurious insects of the Okanagan Valley. **Tortrix alleniana** (Fern.) was first detected as an orchard pest by the author in 1922, when larvae were bred from apple foliage at Vernon. The similarity of the life-history of this species to

that of the oblique-banded leaf-roller is a matter of interest, and the type of injury caused by both species is identical. **Peronea maximana** (B. and B.) was first bred from apple foliage in 1921 at Vernon; this constituted the first record of this insect as a species of economic importance in the Okanagan. Further notes of an historical nature regarding this insect will be given under the life history on a later page.

In considering the life histories of these four species of leaf-roller, we may take them in their order of importance.

The Fruit Tree Leaf-Roller, Cacoecia argyrospila, (Walker).

The control of this insect may at present be considered the most serious problem facing the orchardists in the interior fruit growing sections of the Province. Extensive damage has been caused in many of the commercial orchards in the Okanagan Valley, and although in 1922 these areas were circumscribed, and fairly well defined, the insect, during 1923, spread throughout the whole of the orchard sections of the Valley, besides being reported from Creston in the Kootenays.

The life-history of the fruit-tree leaf-roller may be briefly outlined as follows: the winter is passed in the egg stage upon the trees, the eggs occurring in small, greyish-brown, oval patches upon the bark of the main limbs and twigs. The number of eggs in a single egg mass varies approximately from fifteen to one hundred, or possibly more. The hatching of the eggs from a single mass may extend over a period of from about 24 to 48 hours, and occurs in May just as the buds are commencing to expand. The young larvae at first attack the opening buds, and later the blossoms and fruit, much of which is entirely destroyed, or so severely mutilated as to produce only scarred and deformed specimens at picking time. During July the larvae become mature, at which time they appear as cylindrical, pale green caterpillars with dark heads. Foliage injury is extensive, and considerable quantities of silk are spun by the larvae, which conceal themselves in nests formed from leaves tied together with silken threads. Pupation takes place within the protection of the nest used by the caterpillar for concealment. Moths emerge, and are on the wing during the latter part of July, and are active chiefly at dusk. During the daytime the moths lie dormant amongst the foliage of the trees, but large numbers may be observed in flight if the trees are shaken, or disturbed. The eggs are deposited towards the end of the month, and by early August all adults have practically disappeared.

It will be seen that from 9 to 10 months are passed by the fruit-tree leaf-roller in the egg stage, and it is during this period of its existance that control measures should be applied. Applications of miscible oil at an 8 per cent. dilution, put on in early spring, before any bud development has started, will give a good control, especially if thoroughness is observed. Where oil sprays are not used, it will be necessary to apply

sprays containing arsenate of lead after the caterpillars have hatched. In the control of the fruit-tree leaf-roller, thorough covering and high pressure are essentials.

The Oblique-banded Leaf-Roller, Cacoecia rosaceana (Harris).

The past two seasons have witnessed a very considerable increase in the numbers of this pest, and numerous enquiries have been received regarding its depredations.

The life-history of the oblique-banded leaf-roller affords a good example of the necessity of a clear understanding of the habits of an insect in order that repressive measures may be intelligently applied in any given locality. Prior to the year 1922 certain phases in the development of this insect were not well understood, at least in so far as the interior fruit-growing sections of the province were concerned.

It was generally believed that the winter was passed in the egg stage, and that the newly hatched larvae immediately attacked the opening buds, and that its life history was more or less identical with that of the fruit-tree leaf-roller. Recent observations, however, have shown that this is not the case. The oblique-banded leaf-roller passes the winter in the Okanagan Valley as a partly grown caterpillar upon the trees, within the protection of a closely woven silken cocoon. Over-wintering cocoons occur beneath flakes of dead bark, under bud scales attached to the fruit spurs, or in other protected situations. These over-wintering larvae emerge from their hibernating quarters in early spring, as soon as the buds begin to expand, and feed in much the same manner as do the larvae of the fruit-tree leaf-roller, which they closely resemble. Maturity is reached in July, and the adults are on the wing about the middle of that month.

The eggs of the oblique-banded leaf-roller are deposited upon the upper surface of the leaves of apple and other orchard trees during the month of July. A number of eggs are laid together in a flattened oval mass, and are of a pale green colour, closely resembling the leaf surface to which they are attached. Individual egg masses appear as blots of tinted wax, and each mass may contain from 15 to 100 eggs or more. A short time before hatching, the black heads of the larvae may be distinctly seen within the eggs, the masses appearing as though finely stippled with black dots, arranged in symmetrical lines. An interesting point regarding the hatching of the eggs of the oblique-banded leaf-roller is the brief period covered by the emergence of the larvae from a single egg mass, all of which appear to mature at the same time, and emerge within a few minutes of each other. The hatching of a fully incubated egg mass may sometimes be brought about at a given time by jarring the leaf to which the eggs are attached.

The newly hatched caterpillars migrate to the under surfaces of the leaves, and spin fine silken webs in close proximity to the main veins,

beneath which they feed during the entire period of their activity before entering hibernation quarters. In many cases a caterpillar will attach a leaf to an apple with silk, and feed upon the surface of the fruit, eating out small holes in the skin, and causing injury identical with that of the larvae of the bud moth, **Tmetocera ocellana** (Schff.) In late August the tiny caterpillars leave their feeding grounds and spin their cocoons for hibernation upon the twigs and limbs of the trees.

In controlling this insect, the same arsenical applications as are employed against the fruit-tree leaf-roller in early spring should prove effective. The possible value of late summer sprays against the newly hatched larvae is a matter for further experiment.

Tortrix alleniana, Fern.

This insect was first recorded as an orchard pest, in the Okanagan Valley, in the summer of 1922, when larvae were bred from apple foliage. Our notes for the past two seasons indicate that this insect has a life history very similar to that of the oblique-banded leaf-roller, inasmuch as the eggs are laid in July in flattened oval masses upon the upper surface of the leaves of apple trees. Eggs have also been taken upon the foliage of alfalfa, and snowberry. The egg mass of **Tortrix alleniana** differs from that of **Cacoecia rosaceana** in being a pale lemon yellow color, and of more delicate structure. As the hatching period approaches, the mass becomes more or less transparent in appearance, with the heads of the larvae clearly visible. There is no difficulty in distinguishing the eggs of the two species at hatching time, owing to the cloudy appearance of the egg mass of **Tortrix alleniana** as compared with the very regular arrangement of the larval heads in the mass of **Cacoecia rosaceana.**

The newly hatched larvae feed exclusively upon the under surface of the foliage, and also upon the surface of the fruit, in much the same manner as do the larvae of **C. rosaceana.** The young larvae appear to be somewhat gregarious in their habits during the late summer, three or four individuals occasionally being found within the same web beneath a single leaf. Individual larvae may cause injury of an extensive nature during their early life, their work, at this time, being in the majority of cases, more apparent than that of either the bud-moth, or the oblique-banded leaf-roller, both of which insects occur in the same situation, and at the same period of the year.

The young larvae construct hibernating cocoons upon the limbs and twigs during the latter part of July and early August, within which they remain until the following spring, emerging just as the buds begin to expand.

The injury in early summer, by the maturing larvae, is identical with that of the other leaf-rollers already mentioned. The mature larvae measures 23 mm. in length. The head is pale yellowish, with dark brown

markings; thoracic shield pale yellowish, with a dark brown, triangular mark on the caudo-lateral margin on each side. The thoracic shield is divided by a narrow pale line, which is bounded on each side by a narrow pale brown stripe which is considerably wider posteriorly. The whole of the dorsum above the spiracles is very dark green in colour, with the tubercles conspicuous, and of a dull yellowish white. Below the spiracles the body is pale yellowish, with the tubercles of that region light in colour and prominent. In the centre of each tubercle there is a dark brown circular spot, from the centre of which arises a single pale seta. The anal plate is paler than the dorsum, and bears eight setae. There is a pronounced anal fork beneath the posterior margin of the anal plate. The thoracic legs are pale brown; prolegs concolorous with venter. Spiracles dark brown.

The pupa is 12 to 15 mm. in length, very dark brown above, and somewhat paler beneath. Pupation takes place within folded apple leaves in the same manner as with the other leaf-rollers mentioned in this paper. The pupae under observation spent from 12 to 15 days in this stage. Adult emergence from pupae taken in the field covered a period of approximately two months.

Peronea maximana B. & B.

In **Scientific Agriculture,** March, 1921, we find the first authentic record of this insect as an orchard pest in the Okanagan Valley. In this article, "Some notes on the fruit worms of British Columbia," by Mr. R. C. Treherne, Dominion Entomological Branch, Ottawa, this insect is included among the fruit worms of the province, and is remarked upon as follows: "**Peronea, (Alceris) maximana** has proved an interesting insect attacking orchard trees in the Okanagan Valley, not so much from its economic importance, which is slight, but from its identity and discovery. The early authors on British Columbia insects record the presence in the province of **Teras minuta.** Much of the work ascribed to the bud moth, **T. ocellana** and the lesser apple worm has been placed to the credit of **Teras minuta** in the minds of field inspectors. Its presence is popularly believed to exist, and doubtless some moths were originally identified as referable to this species. The writer has, however, been unsuccessful in recovering **Teras minuta,** and all efforts to collect it or its near relatives have failed, until this year, when **Peronea maximana** was bred from the North Okanagan. Its identity was proved by Dr. J. McDunnough, Dominion Entomological Branch, Ottawa."

The life-history of this insect has only been slightly studied, and beyond the fact that larvae were taken on the terminal shoots of apple during the early summer of 1920, and that moths developed from these in August and September nothing is known. Mr. E. H. Blackmore reports that the insect is more or less common on Vancouver Island, and that in some seasons it is extremely common at Fraser Mills, in the lower

Fraser Valley, in September and October, and that supposedly the larvae feed upon alder. The mature larvae measure 14 mm. in length, with the dorsum pale yellowish-green throughout, with no markings apparent. The head is pale yellowish, with the mouth parts of a dull purplish tinge. The ventral surface is paler than the dorsum. Tubercles inconspicuous, bearing short setae.

No mention has been made in this paper of certain other well-known foliage and fruit feeding larvae which are known to occur in the Okanagan Valley, attention being merely drawn to the four species mentioned, all of which cause what is commonly referred to as "leaf-roller injury," and which is distinctive from the work of most other lepidopterous larvae inhabiting the orchard.

NEW RECORDS OF HEMIPTERA FROM BRITISH COLUMBIA

BY W. DOWNES.

Since the year 1921, when a report on collections of **Hemiptera** from British Columbia was published in this journal by Dr. H. M. Parshley, little has been recorded regarding the **Hemiptera** of this province. Much collecting has been done, however, and I have recently had an opportunity of working over the accumulated material. The present list adds 46 species of **Heteroptera** and 68 species of **Homoptera**, making 115 additional species. This brings the number of species of **Heteroptera** known to occur in the Province up to 252 and of **Homoptera** 152. When we consider the restricted areas in which collecting has been carried on, it will be seen that these figures probably fall far short of the actual number of species occurring in our territory. Most of the collecting has been done in the neighbourhood of Victoria, and those records from such places as Penticton, Summerland and Vernon are usually the result of short collecting trips of not more than one or two days duration, usually in late summer or early fall. Very little collecting has been done in the neighbourhood of Vancouver and the Lower Fraser Valley generally, but that district has yielded many species that find a favourable environment in the humid coastal area. In 1920 and 1921 Mr. Buckell collected in the Chilcotin and Barkerville districts and provided many new records and some new species.

I am greatly indebted to Mr. E. P. Van Duzee for his kindness in giving me access to the collections at the California Academy of Sciences and for much generous assistance in the determination of material, and to the following gentlemen who have determined species in various groups: Dr. D. M. De Long, **Cicadellidae**; Dr. H. B. Hungerford, **Aquatic Hemiptera**; Dr. H. H. Knight, **Miridae**; and Mr. W. L. McAtee, **Reduviidae.**

The names of the collectors are: K. F. Auden, E. H. Blackmore, E. R. Buckell, N. L. Cutler, W. Downes, R. Glendenning, A. W. Hanham, George Hopping, T. A. Moilliet, M. H. Ruhmann, R. C. Treherne, E. P. Venables, O. Whittaker.

List of Species.

Heteroptera

Family **Pentatomidae**

Brochymena 4-pustulata (Fabr.). Walhachin, 6/17. (E.R.B.)

Trichopepla aurora Van D. Vernon, 20/6/19. (E.P.V.) Victoria 12/5/22. (E.H.B.)

Tricopepla californica Van D. Mt. Garibaldi, 10/9/23. (K.F.A.) Taken on fruiting heads of **Anemone occidentalis** at a height of 6,000 feet.

Corizus viridicatus Uhl. Summerland, 18/7/23. (W.D.)

Aradus parvicornis Parsh. Midday Valley, 19/7/21. (G. H.) From **Pinus ponderosa.**

Nysius californicus Stal Duncan, 29/6/22. (W.D.)

Ligyrocoris diffusus (Uhl.). Penticton, 16/8/20. (W.D.)

Stignocoris rusticus (Fall.). Vernon, 24/9/19. (W.D.)

Trapezonotus arenarius (Linn.). Goldstream, 12/8/23. (K.F.A.)

Scolopostethus pacificus Barb. Kelowna, 19/1/23. (W.D.) Taken hibernating under bark.

Family **Tingidae**

Corythuca morilli O. and D. Penticton, 18/7/23. (W.D.) Abundant on **Artemisia dracunculoides.**

Physatocheila ornata Van D. Chilliwack, (O. W.) On alder.

Family **Reduviidae**

Ploiariola vagabunda var. **pilosa** Fieb. This was originally recorded as **P. canadensis** (Parsh.). but Mr. McAtee informs me it is identical with the first named, a European species. I have taken it on tree trunks in the city of Vancouver and in Stanley Park, and in Victoria on the shady side of board fences in company with **P. hirtipes,** but not as commonly as the latter.

Ploiariola californica Banks Victoria, 24/5/21. (W.D.) This was abundant in an old henhouse in Victoria among the cobwebs. One specimen was taken in flight at Keatings, B. C., 30/5/22.

Pselliopus spinicollis (Champ.). Lillooet, 7/7/19. (A.W.H.) Taken by Mr. Hanham on Mt. McLean.

Fitchia spinosula Stal. Oliver, 23/8/22. (E.R.B.)

Family **Anthocoridae**

Lyctocoris campestris (Fab.). Victoria, 24/6/21. (W.D.) Abundant in a henhouse in Victoria, where it appeared to be living on the red mites which swarmed under the manure with which coops and boxes were encrusted.

Lyctocoris elongatus (Reut.). Midday Valley, 23/7/21. Under bark of **Pinus ponderosa.**

Tetraphleps latipennis Van. D. Victoria, 23/7/23. (K.F.A.)

Family **Miridae**

Stenodema virens (Linn.). Chilcotin, 16/5/21. (E.R.B.)

Phytocoris commissuralis Van D. Victoria, 8/9/22. (W.D.)

Phytocoris stellatus Van D. Burnaby, 18/8/23. (W.D.)

Phytocoris tiliae Fab. (Vancouver, 23/9/21 and 15/9/23. (W.D.) This European species, evidently introduced, is now quite common in the city of Vancouver, where it occurs on tree trunks in the boulevards. It is a beautiful insect, the hemelytra being usually bright green with irregular black markings. Other specimens may be brownish with black markings, or again the black marks and mottlings may predominate on a pale green or greenish white ground. It is not uncommon in England on palings and tree trunks.

Capsus ater (Linn.). Chilcotin, 27/7/20. (E.R.B.) Vernon, 20/6/19 (E.P.V.)

Lygidea obscura Reut. Barkerville 14/8/21. (E.R.B.)

Lygus atriflavus Knight Mt. McLean, 6/7/19. (A.W.H.)

Lygus elisus var. **viridiscutatus** Knight Victoria, 11/5/21. (W.D.)

Lygus rubicundus var. **winnipegensis** Knight Chilcotin, 18/5/21, (E.R.B.)

Lygus distinguendas Stal. Barkervelle, 14/8/21. (E.R.B.)

Neolygus confusus Knight Barkerville, 14/8/21. (E.R.B.)

Clivinema fusca new species

General colour of dorsal surface, except scutellum and membrane, brown; antennae brown; head and scutellum dark brown; tylus black; membrane hyaline clouded fuscous; disc of abdomen light red; ventral surface black except abdominal margins, which are red; genital segments mostly reddish yellow; coxae and tarsi black, legs brownish yellow."

In the specimen described the sides of the scutellum are bordered with a line of white waxy excretion, and the propleura, sternal plates, sides of the abdominal segments and margins of abdomen are partly coated with the same substance.

Head produced before the eyes, the vertex convex with a median line of pale pubescence extending over the frons nearly to the base of the tylus and a narrow border of pubescence behind each eye. Pronotum with entire surface rugose and coarsely pubescent, the anterior margin strongly incised at the middle; the apical portion of the pronotum convex, depressed deeply below the posterior portion; posterior margin sinuate; scutellum pubescent, raised tumid, the apex depressed; hemelytra, except membrane, finely and evenly punctate and covered with short pubescence; ventral surface finely pubescent; legs slightly hairy, the outer sides of the femora with a line of black dots extending nearly their entire length.

Form elongate oval. Length 5.2 mm., width 2 mm. Holotype, female, Saanich District, B. C., 10/7/23. (W.D.) in the National Collection at Ottawa. Described from one specimen collected by sweeping at the top of Mt. Douglas, a hill a few miles north of Victoria.

Ceratocapsus fusiformis Van D. Saanich Dist. 18/8/22. (W.D.)

Labops hirtus Knight Chilcotin, 23/7/20. (E.R.B.)

Tiryus punctulatus (Reut.). Penticton, 16/8/20 (W.D.)

Hadronema robusta Uhl. Summerland, 17/7/23. (W.D.)

Hadronema princeps Uhl. Summerland, 17/7/23. (W.D.)

Plesiocoris rugicollis (Fall.). Barkerville, 14/8/21. (E.R.B.)

Orthotylus dorsalis (Prov.). Penticton, 15/7/23: (W.D.)

Orthotylus katmai Knight Barkerville, 14/8/21. (E.R.B.)

Psallus alnicola D. and S. Barkerville, 14/8/21. (E.R.B.)

Plagiognathus fraternus Uhl. Duncan, 28/7/19. (W.D.)

Family **Saldidae**

Saldula explanata Uhl. Mt. Wahleach, 28/7/23. (K.F.A.)

Family **Nepidae**

Ranatra americana Montd. Vernon, 3/10/20. (W.D.)

Family **Corixidae**

Callicorixa praeusta (Fieb.). Saanich Dist. 17/6/19. (W.D.)

Arctocorixa laevigata (Uhl.). Vernon, 26/9/19. (W.D.)

Homoptera

Family **Cercopidae**

Philaenus leucopthalmus var. **lateralis** (Linn.). Victoria, 25/6/21. (W.D.)

Clastoptera lineatocollis Stal. Summerland, 18/7/23. (W.D.)

Clastoptera lineatocollis var. **binotata** Ball. Summerland, 18/7/23. (W.D.) Swept in fair numbers from rabbit brush (**Bigelovia**).

Family **Membracidae**

Stictocephala franciscana. Goldstream, 15/7/23. (K.F.A.)

Family **Cicadellidae**

Koebelia californica Bak. Goldstream. 27/6/23. (E.H.B.)

Agallia californica Bak. Saanich Dist. 19/4/18. (W.D.)

Idiocerus femoratus Ball. Barkerville, 14/8/21. (E.R.B.)

Idiocerus suturalis var. **vagus** Ball. Barkerville. 1/9/20. (E.R.B.)

Macropsis occidentalis (Van D.). Saanich Dist. 7/7/19. (W.D.)

Oncopsis sobrius (Walk.) Vancouver, 20/7/23. (W.D.) On alder.

Oncopsis californicus Van D. Victoria, 3/8/22. (W.D.)

Oncopsis fitchi Van D. Vernon, 8/7/20. (M.H.R.)

Gypona 8-lineata var. **striata** Burm. Enderby, 28/8/20. (W.D.)

Acucephalus nervosus (Schrank). Agassiz, 5/10/21. (W.D.)

Acucephalus albifrons (Linn.). Victoria, 14/9/21. (W.D.)

Parabolocratus viridis (Uhl.). Vernon, 13/6/17. (R.C.T.)

Aligia jucunda (Uhl.). Victoria, 30/8/20. (W.D.)

Mesamia coloradensis (G. and B.). Penticton, 21/9/19. (W.D.)

Scaphoideus immistus (Say.). Penticton, 16/8/20. (W.D.)

Platymetopius oregonensis Bak. Saanich Dist. 3/8/18. (W.D.)

Deltocephalus inimicus (Say.). Vernon, 26/9/18. (W.D.)

Deltocephalus ocellaris (Fall.). Chilcotin, 1/9/20. (E.R.B.)

Deltocephalus striatus Linn. Chilcotin, 23/7/20. (E.R.B.)

Deltocephalus punctatus O. and B. Victoria, 25/6/21. (W.D.)

Deltocephalus abdominalis (Fabr.). Chilcotin, 23/7/20. (E.R.B.)

Deltocephalus escalantus (Ball.). Chilcotin, 1/9/20. (E.R.B.)

Euscelis vaccinii Van D. Victoria, 25/6/21. (W.D.)

Euscelis instabilis Van D. Penticton, 15/7/23. (W.D.)

Eutettix scitulus Ball. Penticton, 21/9/19. (W.D.)

Phlepsius superbus Van D. Victoria, 10/8/21. (W.D.)

Phlepsius lascivius Ball. Penticton 15/7/21. (W.D.)

Phlepsius irroratus (Say.). Saanich Distr. 18/8/22. (W.D.)

Phlepsius fulvidorsum (Fitch.). Penticton, 16/8/20. (W.D.)

Phlepsius apertinus O. and L. Penticton, 16/8/20. (W.D.)

Acinopterus acuminatus var. **viridis** Ball. Summerland, 17/7/23, (W.D.)

Thamnotettix subcupraeus (Prov.). Enderby, 22/8/20. (W.D.)

Thamnotettix cockerelli Ball. Chilcotin, 29/7/20. (E.R.B.)

Thamnotettix eburatus Van D. Penticton, 21/9/19. (W.D.)

Thamnotettix belli (Uhl.) Barkerville, 14/8/21. (E.R.B.)

Thamnotettix mendicus Ball. Penticton, 16/8/20. (W.D.)

Thamnotettix aureolus Van D. Victoria, 12/6/18. (W.D.)

Thamnotettix waldanus Ball. Penticton, 15/7/23. (W.D.)

Thamnotettix smithi Van D. Shawnigan, 15/9/22. (W.D.)

Cicadula variata (Fall.). Penticton, 16/8/20. (W.D.)

Cicadula divisa (Uhl.). Shawnigan, 15/9/22). (W.D.)

Cicadula lineatifrons (Stal.). Vancouver, 21/9/21. (W.D.)

Balclutha osborni Van D. Vernon, 10/6/17. (R.C.T.)

Eugnathodus abdominalis Van D. Vancouver, 21/9/21. (W.D.)

Dikraneura abnormis (Walsh.). Chilcotin, 29/6/20. (E.R.B.)

Empoasca aureoviridis (Uhl.). Chilcotin, 1/9/20. (E.R.B.)

Empoasca unicolor Gill. Vernon, 15/4/12. (M.H.R.)

Empoasca nigra G. and B. (Var.) Penticton, 21/9/19. (W.D.)

Empoasca aspersa G. and B. Penticton, 21/9/19. (W.D.)

Empoasca alboneura Gill. Vernon, 10/6/18. (R.C.T.)

Empoasca flavescens (Fabr.). Vernon, 8/6/18. (R.C.T.)

Typhlocyba ulmi (Linn.). Vernon, 29/9/19. Victoria, 12/8/20. (W. D.)

Typhlocyba bifasciata G. and B. Shawnigan, 21/7/18. (W.D.)

Family **Fulgoridae**

Scolops angustatus Uhl. Penticton, 16/8/20. (W.D.)

Elidiptera henshawi Van D. Victoria, 8/7/23. (K.F.A.)

Catonia nemoralis Van D. Goldstream, 17/6/23. (K.F.A.)

Cixius misellus Van D. Burnaby, 18/8/23. (W.D.)
On **Pinus contorta** at Burnaby Lake.

Cixius coeloepium Fitch. Victoria, (E.H.B.) no date.

Bruchomorpha suturalis Melich. Enderby, 22/ 8/ 20. (W.D.)

Otiocerus degeeri Kby. Vavenby, 20/9/22. (T.A.M.)
Saanich, 13/8/22. (W.D.)

Stenocranus dorsalis (Fieb.) Shawnigan, 15/9/22. (W.D.)

Laccocera vittipennis Van D. Gordon Head, 17/7/20. (W.D.)

Family **Chermidae**

Aphalara angustipennis Crawf. Duncan, 29/6/22. (W.D.)

Psyllia alni var. **americana** (Crawf.). Sooke, 30/6/23. (W.D.) on alder; Victoria, 8/9/22. (W.D.) on cottonwood.

THE ELM-CURRANT APHIS (Eriosoma ulmi L.)

BY R. GLENDENNING.

RELATIONSHIP AND DISTINGUISHING FEATURES

This aphid is a double host species and has a rather interesting life-history and relationship.

In the genus **Eriosoma (Schizoneura)** there are at present known some four or five species which use the various elms as primary or winter hosts. These species have been badly mixed in the past, but, now that their complete life-histories are known, they are readily distinguishable.

lanigera, Hausman, the common woolly aphis of the apple, alternates normally between the American elm **(U. americana)** and apple.

americana, Riley, spends the winter on American elm, and the summer on the roots of the Juneberry **(Amelanchier).**

rileyi, Thomas, spends its whole life on the bark and twigs of American elm and migrates only between trees of the same species.

lanuginosa, Hartig, has been recently co-related with **pyricola** (B. and D.), and migrates from English elm **(campestris** and vars.) to the roots of pear trees.

ulmi L. has as its winter host English elm, and migrates in early summer to currants and gooseberries, forming subterranean colonies on the roots.

The separation of these species on their summer hosts is easy, as apparently they are constant in their habits.

On the elms they are also separable from each other without recourse to their structural differences, which are rather minute.

KEY TO SPECIES OF ERIOSOMA ON ELMS IN CANADA.

On American elm—Rosette type of gall, leaves and twigs in continuous malformation ..... **lanigera**

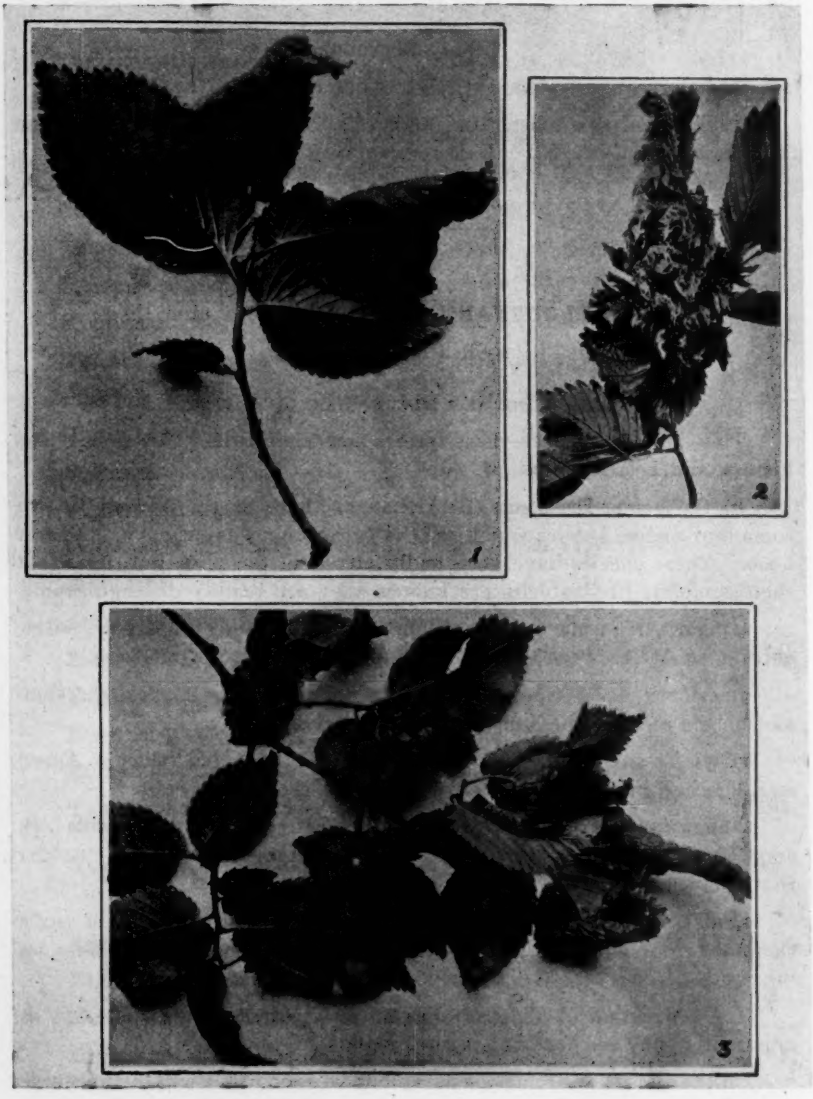


Fig. 1—Leafcurl caused by E. americana (original).

Fig. 2—Rosette curl of E. lanigera (after patch).

Fig. 3—Leaf curl caused by E. ulmi (original).

Leaves curled singly, usually one-half of blade only involved ..... **americana**

No leaf curl, insect feeding on wooly colonies on trunk and branches only ..... **rileyi**

On English elm—Margin of leaf enrolled usually to midrib only, no thickening tissue ..... **ulmi**

Whole leaf involved, tissue and veins much thickened, becoming baglike ..... **lanuginosa**

The only two galls liable to be confused are those of **americana** and **ulmi**, which, although on different species of elm, are very similar. The lice contained, however, are distinguishable both macroscopically and microscopically.

The young stages of **americana** are bluish-purple, those of **ulmi** are green, both covered with a flocculent wax. The pupae of both species are purple with paler wing pads. Definite determinations may be made by the antennae of the winged individuals. In **ulmi** segment III. being nearly twice the length of IV.+V.+VI., and segment V. is without annular sensoria, while **americana** has III. equal to IV+V.+VI. and segment V. has annulations.

Distribution:

The species **ulmi** with which we are dealing is not a native insect in America, but has been introduced from Europe at a comparatively recent date.

It was first recorded from Maine in 1913 on elm, but has been seldom recorded from black currant roots in America.

In British Columbia it was first reported in 1920, when Mr. W. A. Ross identified specimens collected by Mr. W. H. Robertson, Provincial Horticulturist, from black currant roots in a nursery at Chilliwack.

In the spring of 1921 it was located freely on English elm, both at Chilliwack and Agassiz, and notes on its life-history have been taken during the following seasons:

LIFE-HISTORY.

The eggs, which are laid in the fall on the elm trunk, hatch between April 15th and 30th, according to the season. The newly emerged nymphs crawl to a bursting bud, often several yards distant, and ensconce on the underside of a young leaf. These individuals become the stem-mothers and remain in the leaf until death. With the feeding of the insects the leaf curls, forming a pseudo-gall in about a week, and thus protecting to some extent the lice therein.

The stem-mother moults four times and commences depositing young when about three weeks old. Approximately fifty young are deposited

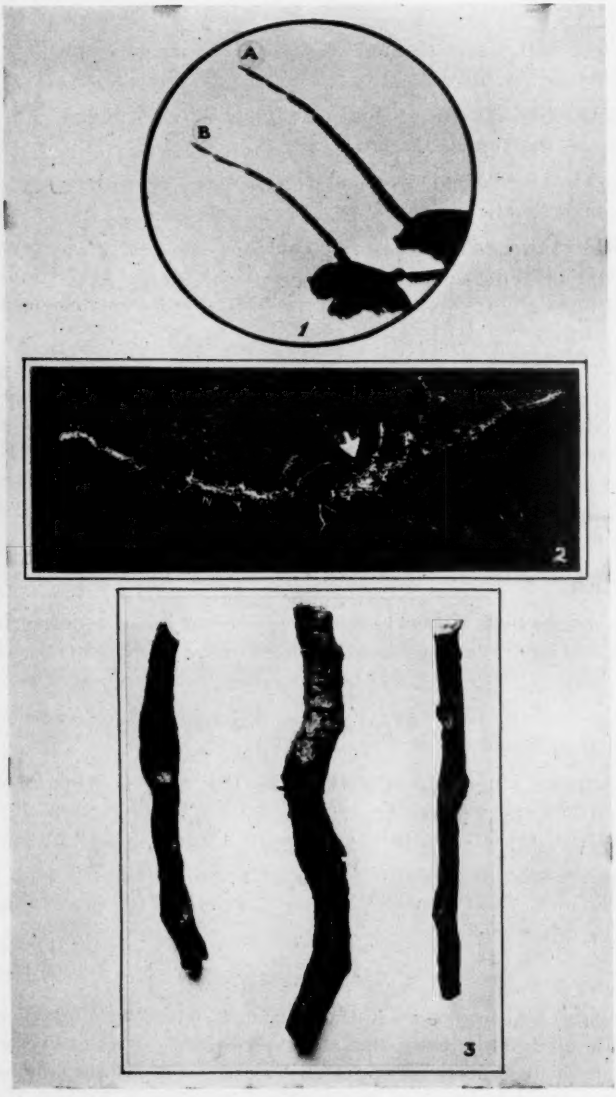


Fig. 1—"A" antenna of E. ulmi
"B" antenna of E. americana } *Spring migrants, (original).*

Fig. 2—Colony of E. ulmi on currant root, (original).

Fig. 3—Roots of black currant showing injury by E. ulmi, (original)

by each stem-mother. The lice of this second generation become winged and leave the elm early in June.

The life-history of **lanigera**, the woolly aphis of apple, differs here from this and other species of **Eriosoma**, since an apterous viviparous generation is produced by the stem-mother, this second generation producing the spring migrants, whereas with **ulmi**, as stated above, the spring migrants are the direct progeny of the stem-mothers without an intervening generation.

The spring migrants, upon leaving the gall, fly to black currant or gooseberry, often at a considerable distance; infections having been located on currants two miles from any elms.

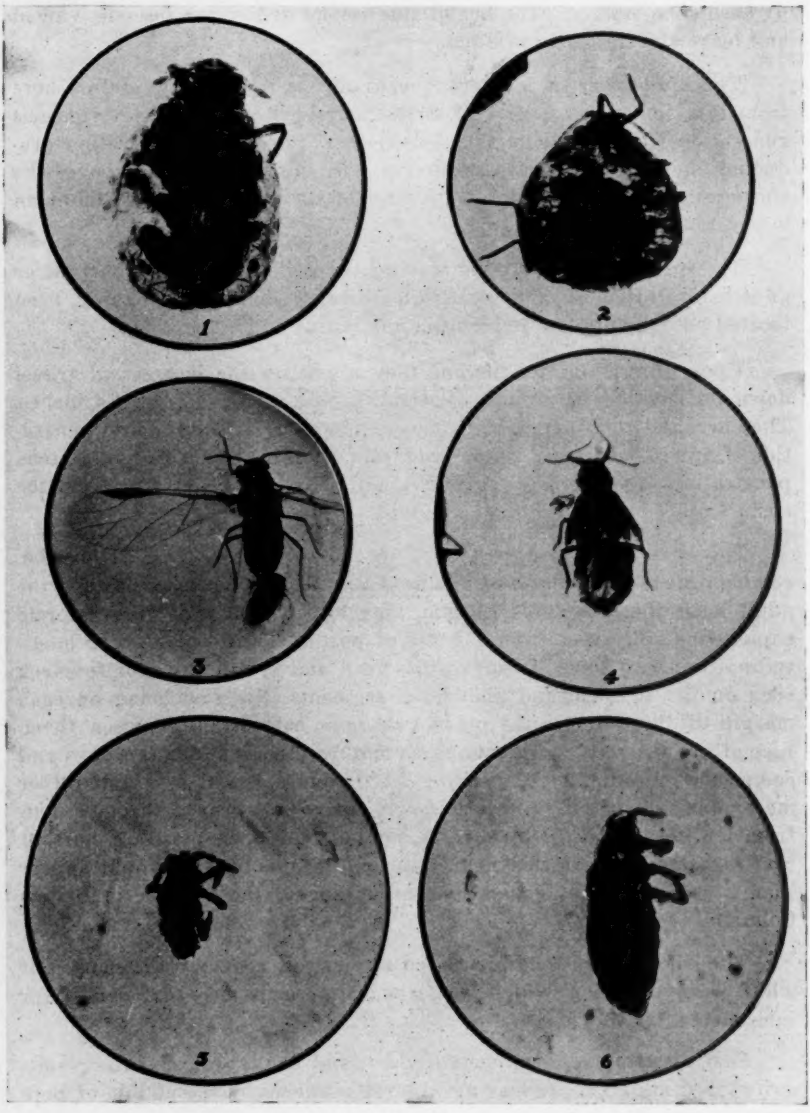
Upon arrival on the currant they alight on the leaves and travel down the stem to the ground, penetrating to a depth of from 1-4 inches. They here deposit from 12-15 young each, which become the first generation of apterous root lice which gradually colonize the entire root system, penetrating to a depth of three feet and often occur five feet from the stem.

This root louse, originally described as **fodiens**, is pale yellow, becoming orange after the third moult. Either 3 or 4 moults occur, and the adult louse then measures 1.8 mm. long by .75 mm. wide; they secrete copiously a silky wax from a series of pores. These pores occur longitudinally in two rows of four on the head and in four rows of fourteen each on the thoracic and abdominal segments, one row being on each margin of the dorsum, the other two rows equidistant between them. Lice of the apterous root generations mature in about fourteen days and commence reproduction, depositing 25-30 young each at a rate of rather more than one per day. No complete series was reared through, but, from the data obtained by several batches reared on pieces of currant root in petri dishes buried in the soil of the insectary, it would appear that from 5 to 6 root generations occur during the summer in British Columbia.

The colonies are readily located on currant roots by the masses of white waxy secretion, which indicates one or more lice, and persist for some time after they die.

Early in September pupae may be found in the soil, and the resultant winged migrants are leaving in large numbers by the middle of September, stragglers often continuing to emerge from the ground as late as the middle of October. The autumn migrants fly back to English elm, where, alighting on the trunk and main branches, they deposit the sexed forms.

The migrants are found most abundantly at a height of from five to seven feet from the ground, just below the main branches.



E. ulmi.

Fig. 1—Adult root louse, (X25).

Fig. 2—Stem mother, (X15).

Fig. 3—Fall migrant depositing young, (X10).

Fig. 4—Pupa of spring migrant, (X7).

Fig. 5—Male, (X40).

Fig. 6—Oriparous female, (X40).

(*All photos original*).

Each migrant deposits six or seven sexed individuals, which, as characteristic of the sexual forms of this genus are without functioning mouth parts.

These males and females live for about a week hidden in the crevices of the bark and amongst the damp moss of the trunk. Four moults take place before mating, after which operation the male soon dies. The female lives for a day or two and may or may not extrude her single egg before death. Eggs may often be found apparently healthy, with the shrivelled skin of the mother still adhering.

The sexes are without wooly secretion, pale straw in color, the males smaller and darker than the females, which measure 1 mm. in length; the males being only one-half mm. long.

The egg is elongate, about .6 mm. long, pellucid when laid, becoming straw yellow by spring. The eggs are not attached to anything when laid, but are simply deposited in crevices amongst the moss stems.

ECONOMIC IMPORTANCE AND CONTROL.

This insect has not proved to be of serious economic importance so far in America. It is, however, reported by Theobald as doing serious damage to young currants in the nursery row in England.

In the event of its increasing to serious extent, the following observations may be useful:

In the control of this insect on its primary host, the elm, the most vulnerable period appears to be when the fall migrants are clustered on the trunks, depositing the sexes there. At that time even one application of nicotine sulphate would undoubtedly destroy a very large percentage of this migration, and two applications ten days apart would undoubtedly destroy almost the entire number.

Where elms have been rendered unsightly by leaf curls made either by this species or other **Eriosomas**, as often occurs, the above procedure should be followed.

The leaf curls are almost impenetrable by sprays, and, with the additional protection the lice receive from their waxy secretion, they are very difficult to destroy at this stage in their life-history.

Experiments were conducted at Agassiz in 1921 with soil insecticides, such as carbon bisulphide, naphthalene, nicotine sulphate, but all failed through lack of penetration, and whereas the subterranean forms descend several feet, it would appear economically impossible to treat the roots of small fruits thus.

In 1923 an experiment was conducted with naphthalene as a deterrent, the object being to prevent the deposition of the root form by the spring migrants.

Two rows of black currants in a block adjacent to heavily infested English elm were treated with naphthalene compound (naphthalene and wood ashes) just as the migrants were leaving the elms. The treated rows kept entirely free from root infestations for two weeks. A few migrants were found in the soil and an occasional root form, but always dead and discolored. The untreated rows showed numbers of migrants, and infection of the roots soon became general. Eventually, when the effect of the light dose of naphthalene disappeared, the later migrants infected the roots of the treated rows.

From the result of these experiments it would appear that a heavier dressing of crude naphthalene—six handfuls to each bush hoed in to a depth of 2-3 inches—would be satisfactory.

PRELIMINARY LIST OF APHIDIDAE OF BRITISH COLUMBIA

By R. Glendenning

Callipternini (Tribe).

Phyllaphis fagi (L.). On copper beech. Agassiz. The copiously flocculent lice are frequent all summer on the undersides of the leaves.

Chromaphis juglandicola (Kalt). On walnut. Agassiz.

Therioaphis tiliae (L.). Common on lime and linden, **Tilia** sp. on Experimental Farm, Agassiz. A very distinct species. Body with black bars and wing veins heavily bordered with black.

Euceraphis gillettei (D'son). A large free-flying species, using **Alnus oregona** as a primary host; also found on Birch.

Euceraphis betulae (Koch). A similar species frequent on Birch.

Myzocallis querci (Kalt). A small green species on introduced oak—Agassiz and Westminster.

Drepanosiphum platanoides (Schrank). A large active species very common on **Acer pseudo-platanus** in the Lower Fraser Valley. Very objectionable from copious excretion of honey dew, on which a black fungus grows.

Chaitophorus viminalis (Monell). Frequent on native cottonwood **(P. trichocarpa)**, rendering the leaves very sticky.

Periphyllus americanus (Baker). A dark red species on **Acer circinatum** —dimorphic—tiding over the dry weather thus.

Neothomasia populicola (Thomas). Frequent on petioles of cottonwood leaves. Apterae yellowish with a black **Y** on back.

Melanoxantherium populifoliae (Fitch). On twigs of Salix sps.

Melanoxantherium smithiae (Monell). Similar habits to above but with shorter cornicles.

Several other **Pterocommnas** have been collected on polpar and willow, but are at present unidentified on account of unsatisfactory state of this sub-tribe.

APHIDINI (Tribe)

Aphidina (Subtribe).

Anuraphis helichrysi (Kalt). Taken on plum at Mission. A European species confined in America to the West. Alternate host species of Compositae.

Anuraphis cardui (L.). Taken on Scotch thistle occasionally.

Anuraphis viburnicola (Gillette). On **Viburnum opulus**, Agassiz.

Anuraphis crataegifoliae (Fitch). Fall migrants taken on apple; migrates to clover.

Anuraphis roseus (Baker).

Anuraphis sorbi (Kalt).

One, or possibly both, of these species taken on apple at Agassiz.

Aphis helianthi (Monell). Taken on **Cornus stolonifera** from the flower heads, Harrison Lake, migrates to composites.

Aphis yuccae (Cowen). Present in 1921 on **Yucca filamentosa** on Experimental Farm, Agassiz.

Aphis neomexicanus (Ckll.). A black species from black currant as primary host only.

Aphis rumicis (L.). Very common on a great variety of hosts—most common on goosefoot, spinach and beans.

Aphis pomi (De Geer). Green apple aphis occurs throughout the Province, remaining on apple entirely.

Brevicoryne brassicae (L.). The cabbage aphis most commonly found on crucifers in British Columbia.

Cavariella capreae (Fabr.). A medium to large species migrating from willow to Umbellifers. Common.

Hyalopteris arundinis (Fab.). The mealy plum aphis. Taken at Agassiz for the first time in 1924.

Rhopalosiphum nympheae (L.). Migrates between plum and various water plants.

Rhopalosiphum prunifoliae (Fitch). The common apple-grain aphid, generally mentioned in literature as **Aphis avenae.**

Rhopalosiphum grabhami (Ckll.). Found on **Lonicera involucrata,** in spring and fall, curling the leaves, which become variously colored. Alternate host unknown. (Possibly belongs to genus **Francoa).**

Subtribe **Macrosiphina**

Amphorophora lactucae (Kalt). This light green species migrates between currants and various ligulate composites.

Amphorophora corylinum (David). Taken on wild hazel, on twigs Agassiz.

Macrosiphoniella millifolii (Fab.). Taken on Achillea at Agassiz. A European species, very distinct by reason of its heavy black and green bars.

Macrosiphum granarium (Kirby). Very common on grains, especially oats, where they cluster in the heads. Larger than **Rho: prunifolium.** Stays on Gramineae all the time.

Macrosiphum rudbeckiae (Fitch). A red aphid, common on composites **(Solidago, etc.).** Found on the stems and, when disturbed, raises its body at right angles to the stem.

Macrosiphum rosae (L.). Occurs on roses, frequently overwinters in viviparous stage in Victoria.

Macrosiphum solanifolii (Ashmead). A similar species, migrating between rose and potato.

Macrosiphum pisi (Kalt). The common pea aphis, very destructive at Agassiz in 1923.

Macrosiphum albifrons (Essig). Specimens collected by Mr. W. Downes in Victoria on **Lupinus arboreus** are apparently this species.

Myzus cerasi (Fab.). On common cherry, curling the leaves, partial migration to **Lepidium.**

Myzus persicae (Sulzer). One of the few aphids apparently omnivorous.

Myzus ribis (L.). Frequent on currants, causing blister-like swellings on leaves.

Phorodon humili (Schrank). The common hop-plum aphis—very common and troublesome on hops.

Mindarinae (Subfamily).

Mindarus abietinus (Koch.). Taken at Agassiz on **Abies grandis,** curling young shoots. This species is considered a relic of the past without any surviving relations.

ERISOMATINI (Tribe)

Erisoma americana (Riley). Causing leaf curl on American elm and migrating to roots of **Amelanchier florida.** Both forms found at Agassiz.

Eriosoma lanigera (Haus.). The common woolly aphis of apple, curling the leaves of American elm, often continuing entirely on apple.

Eriosoma lanuginosa (Hartig). The species occurring on pear roots **(pyricola)** has recently been co-related to this species. A pear root aphis occur on Vancouver Island and is probably this species. The primary host is English elm, the leaves of which it causes to form a bag-like gall. A European species.

Eriosoma ulmi (L.). An introduced species alternating between English elm and the roots of black currant and gooseberry. The root forms were described as **fodiens.**

PEMPHIGINI (Tribe)

Pemphigus betae (Doane.). This beet-root aphis occurs in the Province on mangels, beets, Rumex and Polygonums, using the cottonwood as a winter host. The poplar form was described as **balsamiferae** Williams.

Pemphigus populicaulis (Fitch.). This species makes a petiole gall on cottonwood, and its secondary host was determined this year as **Oenanthe sarmentosa,** Water Parsley **(Umbelliferae).**

Pemphigus gravicornis (Patch.). This species folds the leaves of cottonwood. Its alternate host is unknown.

Pemphigus populi-venae (Fitch). A gall like a cock's comb ascribed to this species has been frequently observed on cottonwood at Agassiz; no alatae, however, were secured. It is believed that this species also migrates to beet.

PROCIPHILINI (Tribe)

Prociphilus corrugatans (Sirrine). An aphid very near this species is commonly found curling the leaves of the native **Pyrus rivularis** at Agassiz. The fall migrants are taken abundantly on various species of **Pyrus** and **Crataegus.**

In Memoriam

R. C. Treherne

In no more fitting place could a memorial notice to "Tre" appear than in our Proceedings, which are in themselves a monument to his energy, his diplomacy, and his cameraderie.

It was impossible to realize, when the sad news of his sudden death arrived, that he had gone and we should see him no more.

Entomologists in British Columbia were looking forward to seeing him in July, to feel his hearty handshake, to hear his genuine laugh, and to consult his well balanced mind, but our hopes were shattered.

Entomology in the Dominion, and especially in British Columbia, has received a serious blow by his death, for his interests were here, and he had done more for entomology in this province than anyone.

To Mr. Treherne belongs the honour of resuscitating our Society in 1911 and of bringing together the two classes of entomological workers and keeping them in happy unison during his tenure of office as Secretary from 1911 to 1916.

Economic entomologists knew his value as an adviser, and, when he was called east in 1921 to take charge of a Division of the Entomological Branch, we in British Columbia knew our loss, the only consolation being the knowledge that he would be a tower of strength at headquarters in our interests.

Mr. Treherne had offers of lucrative positions in Canada, in England and elsewhere, but his soul was in the Branch and he remained true, too true, for his death can be ascribed to his indomitable energy whereby he neglected his health for duty and died in harness.

On the 30th of May he returned ill to Ottawa from an inspection trip in southern Ontario. On the second of June he was forced to go to bed, and on the seventh he died under an operation for acute peritonitis; the one wish of his friends, he had no enemies, is that the trouble had been taken in time.

Besides these Proceedings we have as a memorial, the thrips genus TREHERNIELLA, and the example of his life, a pattern not only for young entomologists to follow.

R. G.

LIST OF MEMBERS, 1924

L. E. Marmont, Maillardville, B. C. ..... Lepidoptera
W. B. Anderson, 1225 Roslyn Road, Victoria, B. C. ..... Lepidoptera
W. R. Buckell, Salmon Arm, B. C.
E. Hearle, Court House, Vernon, B. C. ..... Mosquitoes
M. H. Ruhman, Court House, Vernon, B. C.
E. R. Buckell, Court House, Vernon, B. C. ..... Orthoptera
E. P. Venables, Court House, Vernon, B. C. ..... Lepidoptera
E. H. Blackmore, P. O., Victoria, B. C. ..... Lepidoptera
W. H. Lyne, Court House, Vancouver, B. C. ..... Imported Insects
E. W. White, Dept. of Agriculture, Victoria
R. Glendenning, Agassiz, B. C. ..... Aphids
J. W. Gibson, Dept. of Education, Victoria, B. C.
O. Whittaker, Chilliwack, B. C. ..... Hemiptera
W. E. Ward, C. P. R. Freight Office, Vancouver.
T. A. Moillet, Vavenby, B. C.
W. H. Robertson, Dept. of Agriculture, Victoria, B. C.
C. Garret, Cranbrook, B. C. ..... Diptera and Hymenoptera
F. C. Whitehouse, Nelson, B. C. ..... Odonata
A. W. Hanham, Duncan, B. C. ..... Lepidoptera and Coleoptera
R. Hopping, Court House, Vernon, B. C. ..... Coleoptera
G. O. Day, Duncan, B. C. ..... Lepidoptera
F. Kermode, Prov. Museum, Victoria
J. Davidson, University of B. C., Vancouver.
J. W. Winson, Huntingdon, B. C.
K. F. Auden, Box 1234, Vancouver ..... Coleoptera
A. O. Hope, Duncan, B. C.
W. Downes, Dept. of Agriculture, Victoria, B. C. ..... Hemiptera
R. S. Sherman, 3642 Dundas St., Vancouver, B. C. ..... Diptera
W. H. Gray, 338 St. James Rd., N. Lonsdale P. O., B. C.
P. N. Vroom, University of B. C., Vancouver.
A. P. MacDougall (Miss) University of B. C., Vancouver, B. C. ..... Aphids
C. Bannister, 1154 Robson St., Vancouver, B. C.
G. E. W. Clarke, Court House, Vancouver, B. C.